

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY  
(PCT Rule 43bis.1)

Date of mailing

(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220**FOR FURTHER ACTION**  
See paragraph 2 belowInternational application No.  
PCT/GB2004/000999International filing date (day/month/year)  
11.03.2004Priority date (day/month/year)  
18.03.2003International Patent Classification (IPC) or both national classification and IPC  
G11B5/842, G11B5/712, H01F41/16, H01F10/00, H01F1/00, A61K9/28Applicant  
NANOMAGNETICS LTD

## 1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

## 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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10/549715

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/GB2004/000999

JC20 Rec'd PCT/PTO 16 SEP 2005

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating there has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/000999

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**Box No. II Priority**

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1. ☒ The following document has not been furnished:
- ☒ copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).
  - ☐ translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).
- Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

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**Box No. IV Lack of unity of invention**

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1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☐ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☐ not paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3
- ☐ complied with
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
  - ☐ the parts relating to claims Nos.

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/000999

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-84
	No: Claims	85-86
Inventive step (IS)	Yes: Claims	1-84
	No: Claims	85-86
Industrial applicability (IA)	Yes: Claims	1-86
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)

International application No.

~~1020 Rec'd PCT/PGT/GB2004/000999~~

**Re Item IV.**

The separate inventions/groups of inventions are:

1-25,85-86

a known method used to form a magnetic recording device, and magnetic recording device obtainable by said method

26-47,48-69

a method of forming a magnetisable film or a film of inorganic nanoparticles, said method characterized by using a suspension of magnetisable or inorganic nanoparticles, each having been formed within a protein shell

70-84

a method of forming a protein thin film, said method characterized by including a membrane filtration step

They are not so linked as to form a single general inventive concept (Rule 13.1 PCT) for the following reasons: technical features "*method of forming a film of particles, which comprises preparing a suspension of particles in a carrier fluid and depositing said fluid suspension onto a substrate surface as droplets having a volume less than about 1nl to form said film of particles as a dry residue of the deposited fluid suspension*" which are common to all separate inventions, are not special technical features (they are disclosed in D1 - see below).

**Re Item V.**

1. The following documents are referred to in this communication:

D1 : PAUL CALVERT: "Inkjet Printing for Materials and Devices" CHEM. MATER., vol. 13, 9 December 2001 (2001-12-09), pages 3299-3305, XP002284900

D2 : EP 1 217 616 A (NANOMAGNETICS LTD) 26 June 2002 (2002-06-26)

2. INDEPENDENT CLAIM 85

2.1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 85 is not new in the sense of Article 33(2) PCT:

- Claims for products defined in terms of a process of manufacture are

admissible only if the products as such fulfill the requirements for patentability, i.e. inter alia that they are new and inventive.

- Document D2, however, discloses ( paragraph [0001] ) *"a magnetic recording device having a film of magnetisable nanoparticles"*.

### 3. DEPENDENT CLAIM 86

Dependent claim 86 does not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

### 4. INDEPENDENT CLAIM 1

- 4.1. Document D1, which is considered to represent the most relevant state of the art, discloses (the whole document): *"method of forming a film of magnetisable (inorganic) nanoparticles, which comprises preparing a suspension of magnetisable (inorganic) nanoparticles in a carrier fluid and depositing said fluid suspension onto a substrate surface as droplets having a volume less than about 1nl to form said film of magnetisable (inorganic) nanoparticles as a dry residue of the deposited fluid suspension"*.

From this, the subject-matter of independent claim 1 differs in that said method is used to **form a magnetic recording device** having said film of magnetisable nanoparticles.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT)

- 4.2. The problem to be solved by the present invention may be regarded as *how to obtain very smooth and continuous films demanded for magnetic recording* (see present application, paragraph [0004] ) .

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: no prior art has been found which would suggest use of the above method to form a magnetic recording device. This is a surprising effect of present invention which would not be obvious to those skilled in the art of magnetic recording.

### 5. DEPENDENT CLAIMS 2-25

Claims 2-25 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

6. INDEPENDENT CLAIMS 26 AND 48

6.1. See 4.1. for disclosure of D1.

From this, the subject-matter of independent claim 26 (48) differs in that ***each of magnetisable (inorganic) nanoparticles within the suspension has been formed at least partially within a protein shell***, resp.

The subject-matter of claims 26 and 48 is therefore novel (Article 33(2) PCT).

6.2. The problem to be solved by the present invention may be regarded as *how to storage magnetisable (inorganic) nanoparticles during the deposition of thin film from a suspension*.

The solution to this problem proposed in claim 26 (48) of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: although using of proteins to encapsulate magnetisable (inorganic) nanoparticles is known *per se* (see D2), no prior art has been found which would disclose proteins as storage material for nanoparticles during deposition of thin films from suspensions. This solution would not be obvious to those skilled in the art.

7. DEPENDENT CLAIMS 27-47 and 49-69

Claims 27-47 are dependent on claim 26, and claims 49-69 are dependent on claim 48. As such these claims also meet the requirements of the PCT with respect to novelty and inventive step.

8. INDEPENDENT CLAIM 70

8.1. Document D1 discloses: "*method of forming a protein thin film on the surface of a substrate, which comprises preparing a suspension of protein particles in a carrier fluid and depositing said fluid suspension onto a substrate surface as droplets having a volume less than about 1nl to form said film on the substrate as a dry residue of the deposited fluid suspension*".

From this, the subject-matter of independent claim 70 differs in that said ***protein***

*particles have been subjected to a membrane filtration step prior to deposition.*

The subject-matter of claim 70 is therefore novel (Article 33(2) PCT).

- 8.2. The problem to be solved by the present invention may be regarded as *how to promote the monodispersity of protein particles and how to remove unwanted debris* (see present application, paragraph [0074] ).

The solution to this problem proposed in claim 70 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: no prior art has been found which would suggest use of membrane filtration step before deposition of protein particles from a suspension. This solution would not be obvious to those skilled in the art.

#### 9. DEPENDENT CLAIMS 71-84

Claims 71-84 are dependent on claim 70 and as such also meet the requirements of the PCT with respect to novelty and inventive step.